What we claim is:

1. A method, comprising:

providing a solution of amphiphilic template molecules;

mixing amphiphilic organosilicate precursors into the solution to form a mixture; and

evaporating solvent from the mixture to produce an organosilicate composite with a mesoscopic structure.

2. The method of claim 1, further comprising:

curing the composite in a manner that crosslinks at least a portion of the organosilicate precursors.

3. The method of claim 2, further comprising:

forming a film of the mixture prior to completion of the evaporating.

4. The method of claim 2, wherein the template molecules are amphiphilic block copolymer molecules.

5. The method of claim 4, wherein the amphiphilic organosilicate precursors remain amphiphilic during the curing.

6. The method of claim 5, wherein the crosslinking releases hydrophilic moieties from a portion of the organosilicate precursors.

7. The method of claim 2, further comprising:

performing a chemical treatment that removes a portion of the template molecules from the cured composite.

8. The method of claim 2, wherein hydrophobic moieties bonded to the organosilicate precursors and hydrophilic moieties bonded to the organosilicate precursors are concentrated in separate physical regions of the cured composite.

9. The method of claim 1, wherein the mesoscopic structure includes a dispersion of a micro-structures of a type selected from a group consisting of cylindrical micro-structures, lamellar micro-structures, gyroid micro-structures, and spherical micro-structures.

10. A apparatus, comprising:

a solid that comprises an crosslinked collection of amphiphilic organosilicate precursors; and

wherein the amphiphilic organosilicate precursors form a matrix with an array of micro-structures dispersed in the matrix.

11. The apparatus of claim 10, wherein the micro-structures are voids or pores in the matrix.

12. The apparatus of claim 11, wherein the voids or pores are hydrophilic and portions of the matrix not adjacent to the voids or pores are hydrophobic.

13. The apparatus of claim 11, wherein the solid is non-wettable by water.

14. The apparatus of claim 11, further comprising:

a planar optical waveguide comprising an optical core layer and the solid; and

wherein the solid forms an optical cladding layer for the optical core layer.

15. A method, comprising:

forming a composite with an internal structure by evaporating solvent from a solution comprising amphiphilic block copolymer molecules and amphiphilic organosilicate precursors; and

crosslinking a portion of the organosilicate precursors of the composite to form an organosilicate solid; and

wherein the crosslinking conserves an amphiphilic nature of at least a portion of the organosilicate precursors incorporated into the solid.

16. The method of claim 15, further comprising one of casting, dip-coating, and spin-coating a film of the solution on a substrate prior to completion of the forming a composite.

17. The method of claim 15, wherein the crosslinking produces siloxane bonds between the portion of the organosilicate precursors and causes the portion to shed alkoxide groups.

18. The method of claim of claim 15, further comprising:

chemically extracting block copolymer molecules from the solid to create pores or voids in the solid.

19. The method of claim 18, wherein the pores or voids are hydrophilic and portions of the matrix distant from the pores or voids are hydrophobic.

20. The method of claim 15, wherein the internal structure includes a dispersion of one type of micro-structures in the composite, the type of micro-structures being selected from a group consisting of cylinders, lamellae, gyroids, and spheres.